

## What we claim is

1. An optical waveguide structure, having a crossing and a branching, the waveguide structure comprising in the area of said branching planar waveguides, said planar waveguides comprising a waveguide material that is put into troughs formed in a substrate, said waveguide material having a refractive index higher than the material delimiting the troughs, said waveguide structure further comprising in the area of said crossing fibers which cross in the area of said crossings.
2. A waveguide structure according to claim 1, wherein the waveguide structure is formed in the area between said crossings and said branchings as fibers.
3. A waveguide structure according to claim 1, wherein the waveguide material is formed as an optical polymer.
4. A waveguide structure according to claim 1, wherein the substrate is formed as an organic film material.
5. A multi-layer opto-electrical circuit board, comprising at least one layer with an optical waveguide structure having a crossing and a branching, the waveguide structure comprising in the area of said branching planar waveguides, said planar waveguides comprising a waveguide material that is put into troughs formed in a substrate, said waveguide material having a refractive index higher than the material delimiting the troughs, said waveguide structure further comprising in the area of said crossing fibers which cross in the area of said crossings.

6. A circuit board according to claim 5, wherein the electrical layers of the circuit board are coupled via opto-electrical or electro-optical transducers to the optical waveguide structure.
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7. A method for producing an optical waveguide structure, which comprises a crossing and a branching, the method comprising the steps of
- putting troughs corresponding to the course of the waveguide structure into a substrate;
  - arranging fibers in a portion of the troughs; and
  - placing a waveguide material in the remaining troughs, the waveguide material having a higher refractive index than the material delimiting the troughs,
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- wherein the fibers are arranged in the troughs in the area of the crossings in such a way that they cross in the area of the crossing, and that the waveguide material is put into the troughs in the area of the branching.
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8. A method according to claim 7, wherein fibers are arranged in the troughs in the area between said crossing and said branching before the waveguide material is put into the troughs.
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9. A method according to claim 7, wherein the substrate is formed as an organic film material, into which the troughs are hot-stamped.
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10. A method according to claim 7, wherein the waveguide material is formed as an optical polymer, which is put into the troughs in a fluid state and cured by means of ultra-violet radiation.
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11. A method according to claim 7, wherein the fibers are glued in the troughs.
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